Architecture Overview Diagram & Component Model

An introduction to these key work products

Learning Objectives

- At the end of this lecture, you should be able to:
  - Understand:
    - What is an Architecture Overview Diagram (AOD)
    - What uses are there for an Architecture Overview Diagram
    - What is a Component Model and how is it represented
    - How an AOD and a Component Model relate to an Operational Models
  - Develop a simple **Architecture Overview Diagram**
  - Identify potential issues when reviewing an Architecture Overview Diagram
  - Identify **candidate components for a Component Model**

Architecture Overview Diagram

What is it?

Where does it fit?

Examples

What is an Architecture Overview Diagram?

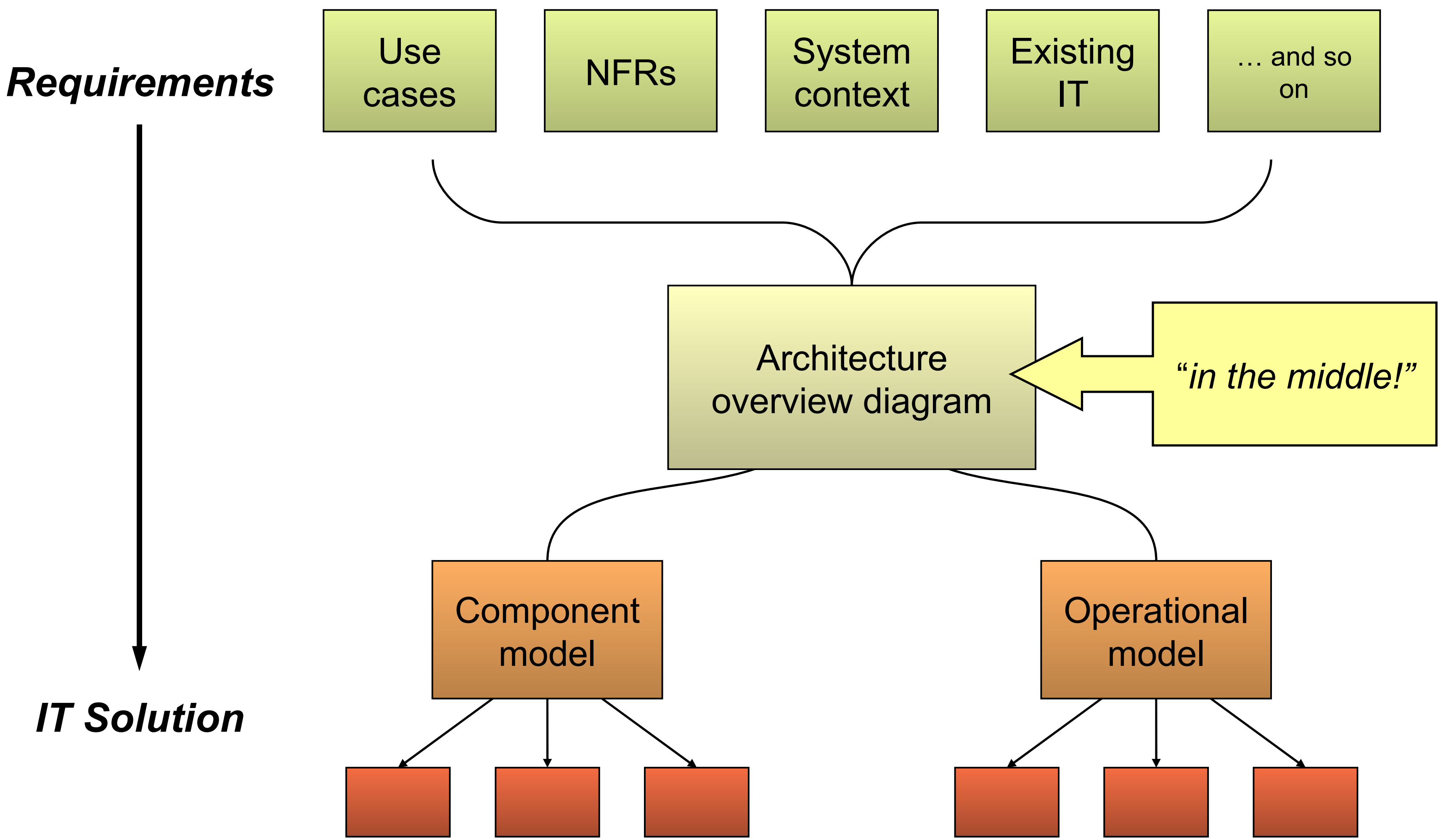
The purpose of this work product is:

- To **communicate** to the **sponsor** and external stakeholders a conceptual understanding of the intended IT system
- To provide a **high-level shared vision** of the architecture and scope of the proposed IT system for the development teams
- To explore and **evaluate alternative architectural options**
- To enable early recognition and validation of the **implications of the architectural approach**
- To facilitate **effective communication** between different communities of stakeholders and developers
- To facilitate orientation for new people who join the project

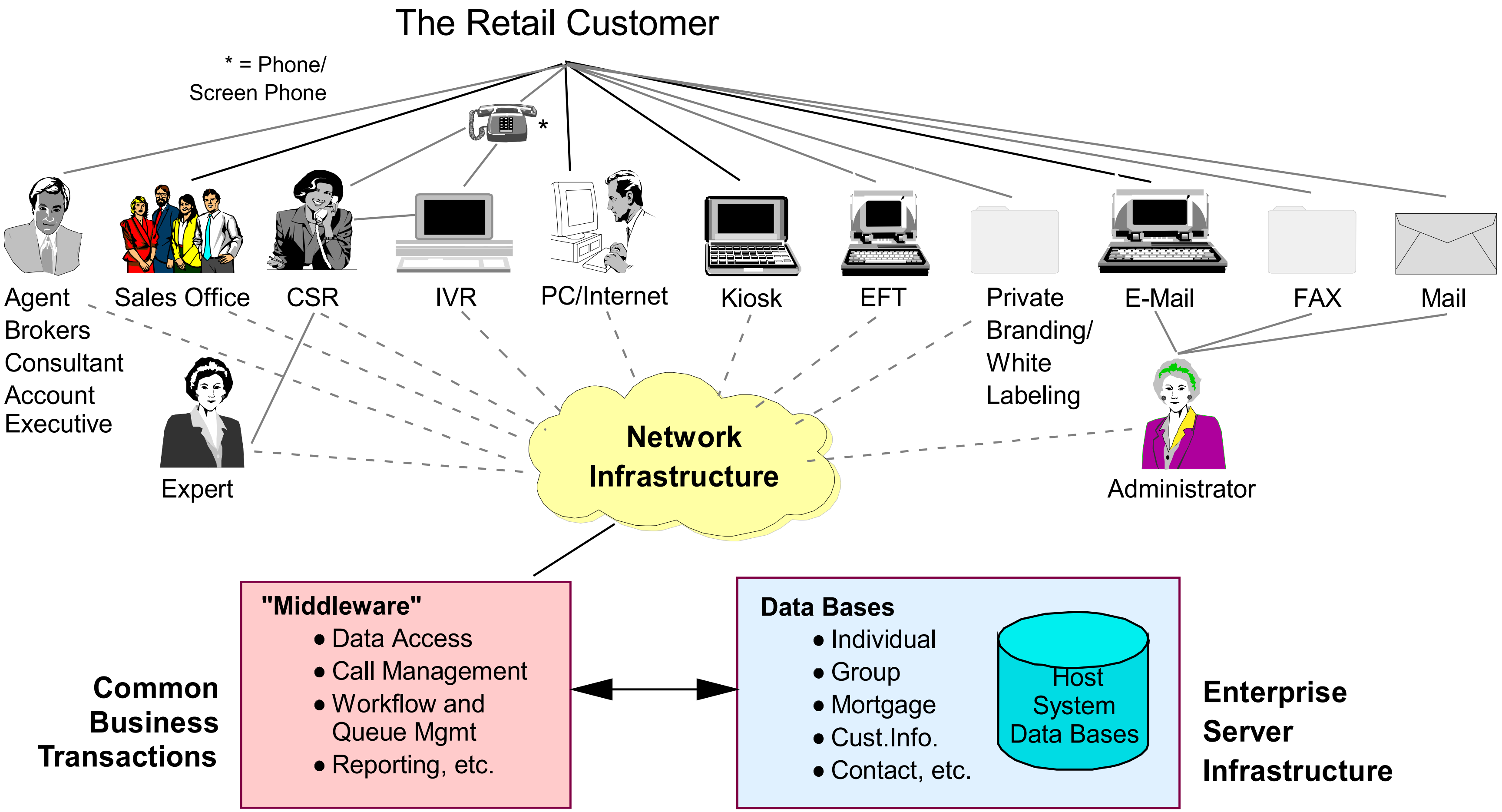
Important things to note:

- An Architecture Overview Diagram contains schematic diagrams that represent the governing ideas and building blocks of an IT system.
- An AOD can include both functional and operational concepts.
- **An AOD is not a model**

Where does the Architecture Overview Diagram fit?



Example 1: Retail multi-channel access



"Middleware"

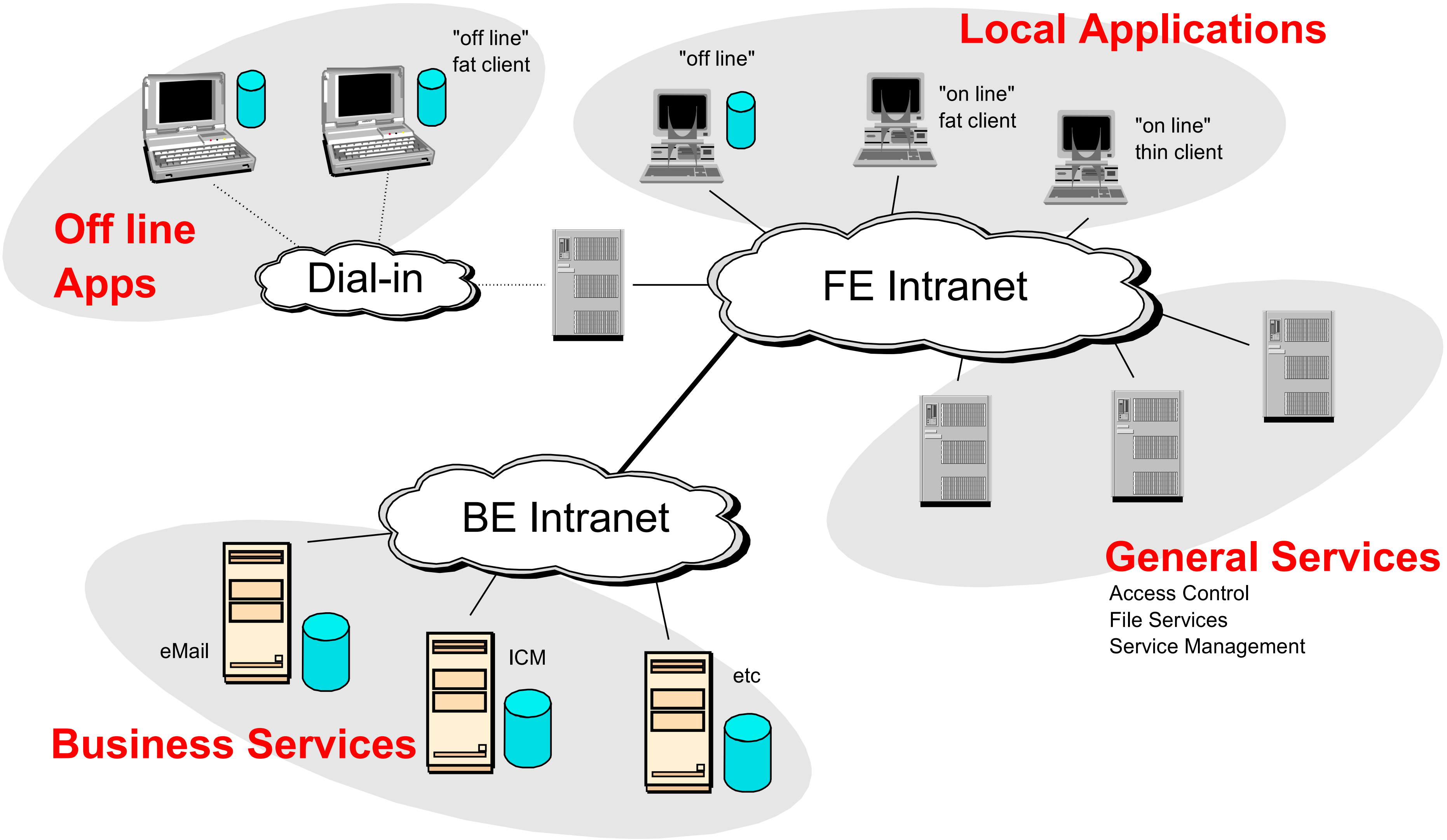
- Data Access
- Call Management
- Workflow and Queue Mgmt
- Reporting, etc.

Data Bases

- Individual
- Group
- Mortgage
- Cust.Info.
- Contact, etc.

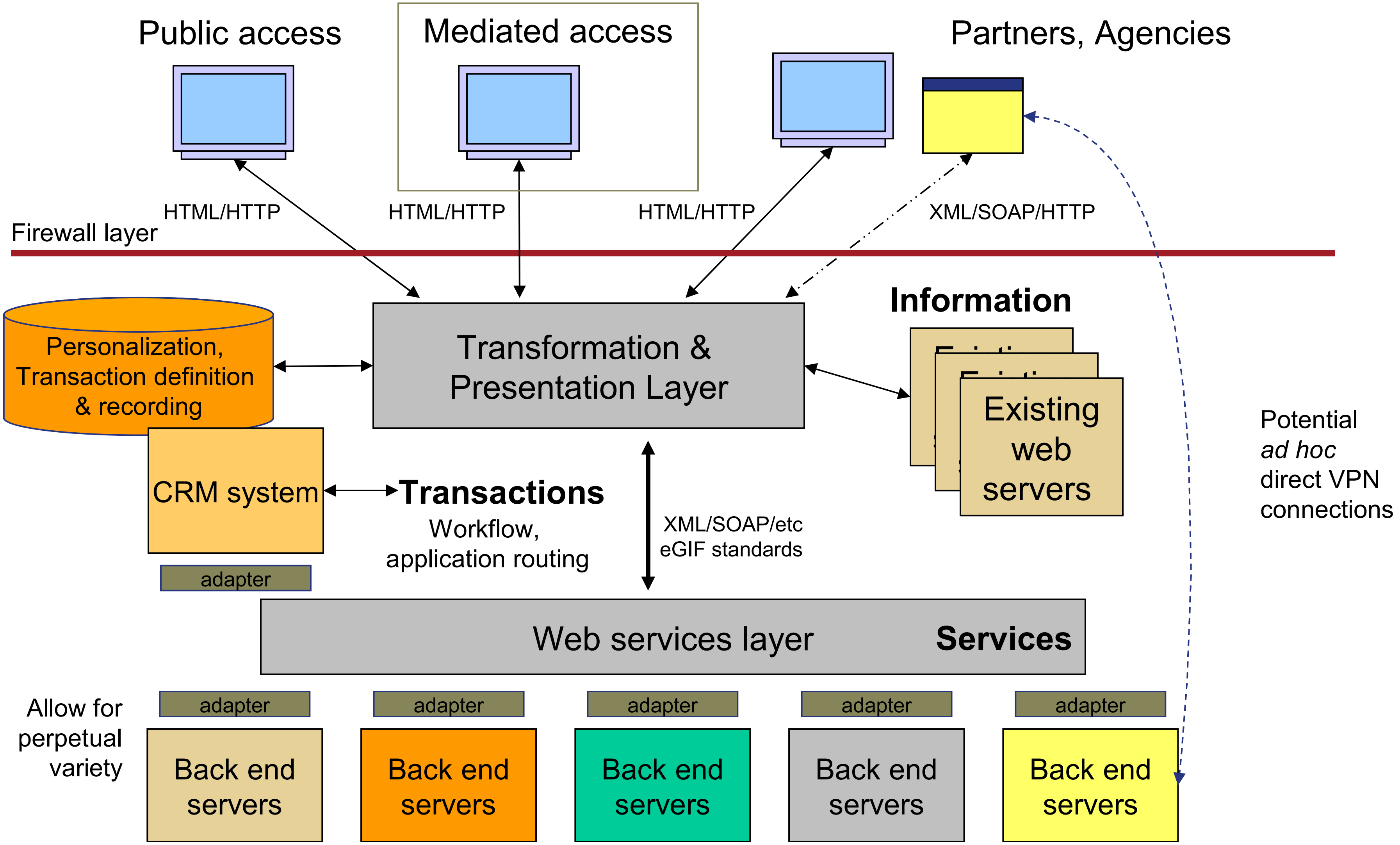
Retail Customer Access Points—The Retail Customer can choose from a variety of ways to interact with the company. The supporting infrastructure should be common whenever possible.

Example 2: Corporate applications



Access Control
File Services
Service Management

Example 3: Local e-government



Public access

Mediated access

Partners, Agencies

HTML/HTTP

HTML/HTTP

HTML/HTTP

XML/SOAP/HTTP

Firewall layer

Personalization, Transaction definition & recording

Transformation & Presentation Layer

Information

Existing web servers

CRM system

adapter

Transactions

Workflow, application routing

XML/SOAP/etc eGIF standards

Potential *ad hoc* direct VPN connections

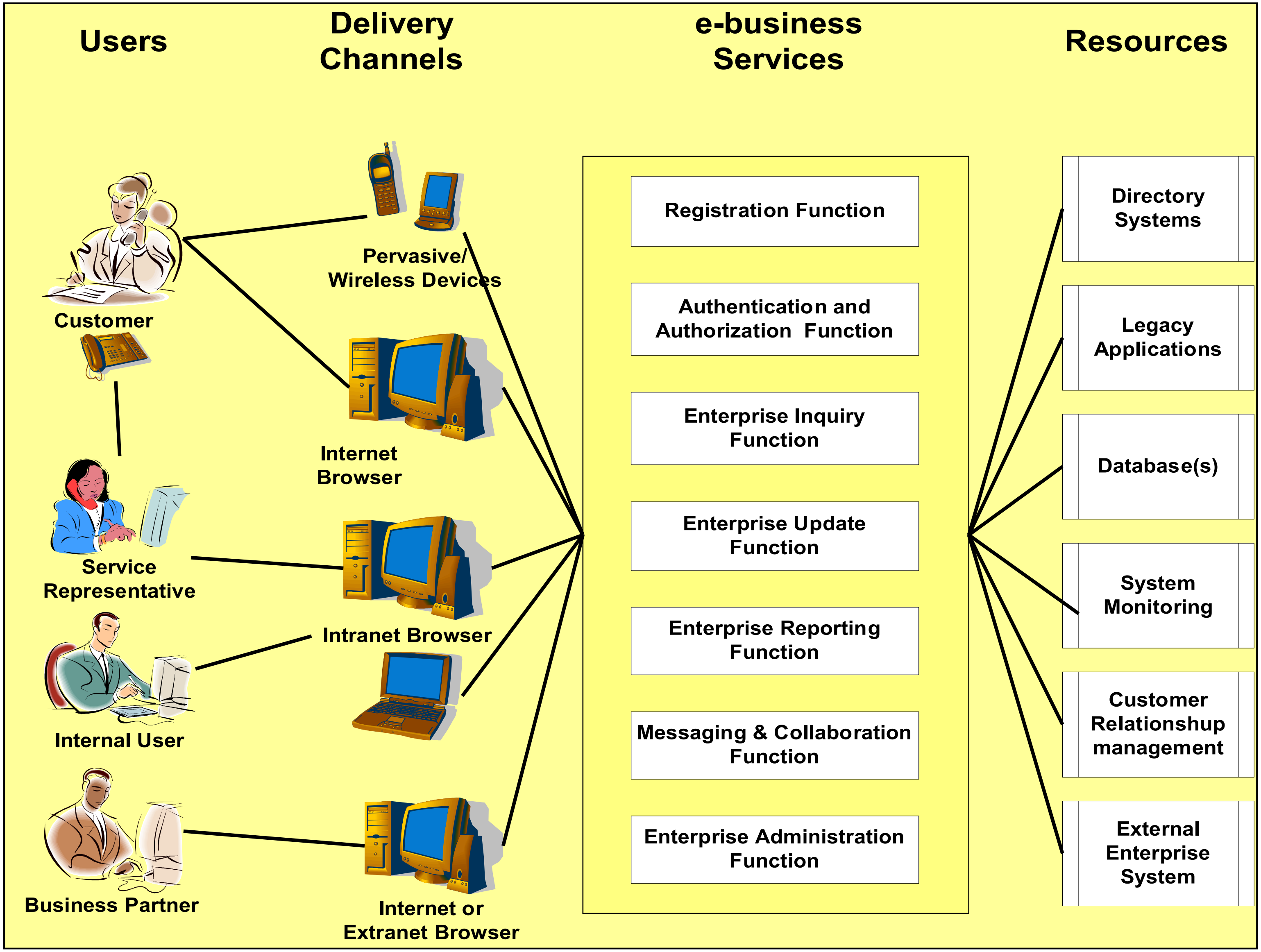
Web services layer

Services

Allow for perpetual variety

adapter	adapter	adapter	adapter	adapter
Back end servers	Back end servers	Back end servers	Back end servers	Back end servers

Example 4: e-business Reference Architecture


Users
Delivery Channels
e-business Services
Resources
Customer
Service Representative
Internal User
Business Partner
Pervasive/ Wireless Devices
Internet Browser
Intranet Browser
Internet or Extranet Browser
Registration Function
Authentication and Authorization Function
Enterprise Inquiry Function
Enterprise Update Function
Enterprise Reporting Function
Messaging & Collaboration Function
Enterprise Administration Function
Directory Systems
Legacy Applications
Database(s)
System Monitoring
Customer Relationshup management
External Enterprise System

Component Model

What is a Component?

What is a Component Model?

How do you create one?

The primary concept used for modular design

- Within the software domain, a component can be defined as "…an encapsulated part of a software system that provides a well-defined interface to its services"

- Components are not limited to application components. They can also be:
  - Technical components
  - System software components
  - Hardware components

  ☞ *examples?*

Components are a formal modelling construct

- Components can be **comprised of other components**

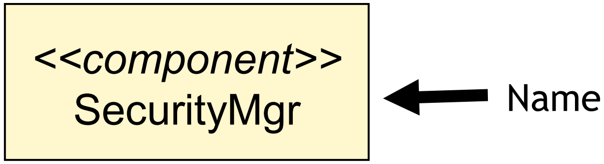
- A subsystem groups components, but cannot be characterized as a component because it does not have interfaces.

- Objects are not very good or useful components

☞ *Why?*

The notation used to represent components is based on UML

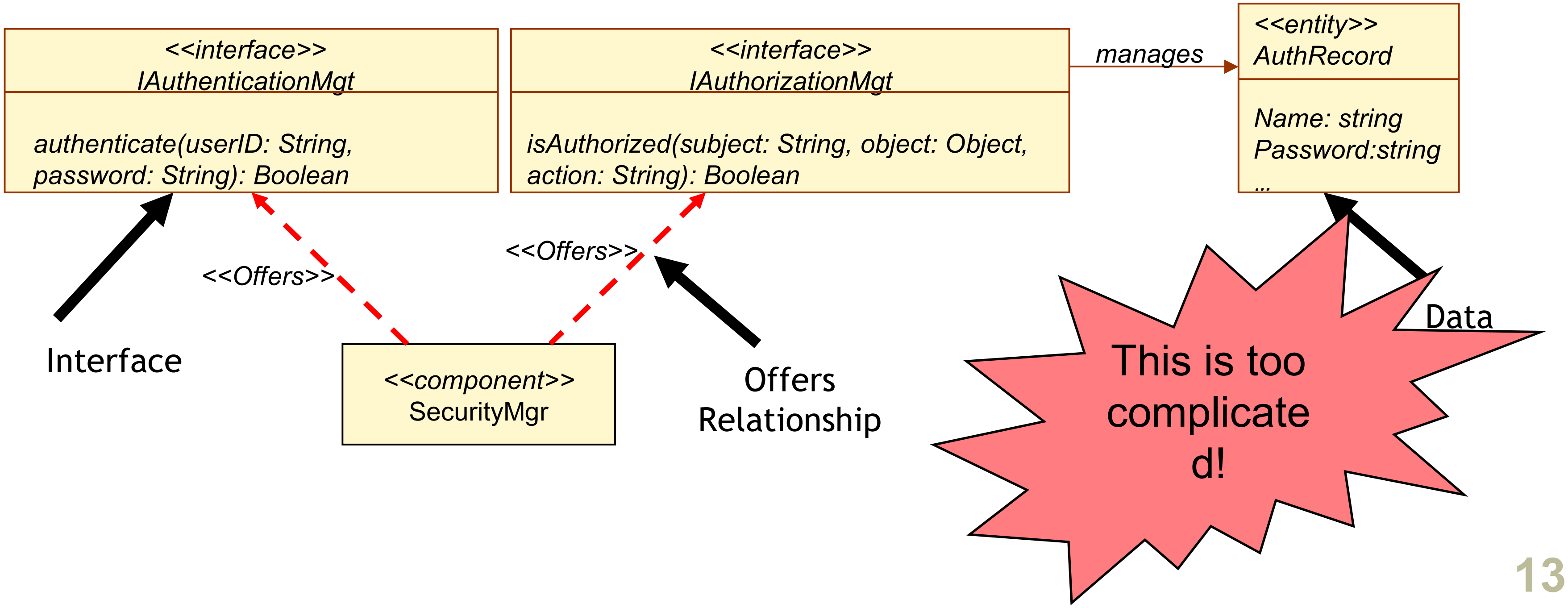
- Component representation uses UML Class notation



<<component>>
SecurityMgr

Name

- Component interfaces specify their services



<<interface>>
IAuthenticationMgt

authenticate(userID: String, password: String): Boolean

<<interface>>
IAuthorizationMgt

isAuthorized(subject: String, object: Object, action: String): Boolean

manages

<<entity>>
AuthRecord

Name: string
Password:string
...

<<Offers>>

<<Offers>>

<<component>>
SecurityMgr

Interface

Offers Relationship

Data

This is too complicate d!

The function of an IT System is described by components

- **Components**
  - Are identified based on their responsibilities that collectively achieve the system behavior
- **Component Interfaces**
  - Represent an agreement of the requested services that describes component responsibilities and access to the interfaces' data
- A component is **developed through several stages**, including:
  - Component **identification**
  - Component **specification**
  - Component **realisation**

Component Models include two types of diagram

- **Component Relationship Diagram** (Static Model)
  - Is represented by a variation of the UML Class Diagram

- **Component Interaction Diagram** (Dynamic Model)
  - Depicts component relationships and dependencies
  - Illustrates how components collaborate to achieve system functionality
  - Is represented by a variation of the UML Collaboration or Sequence Diagram

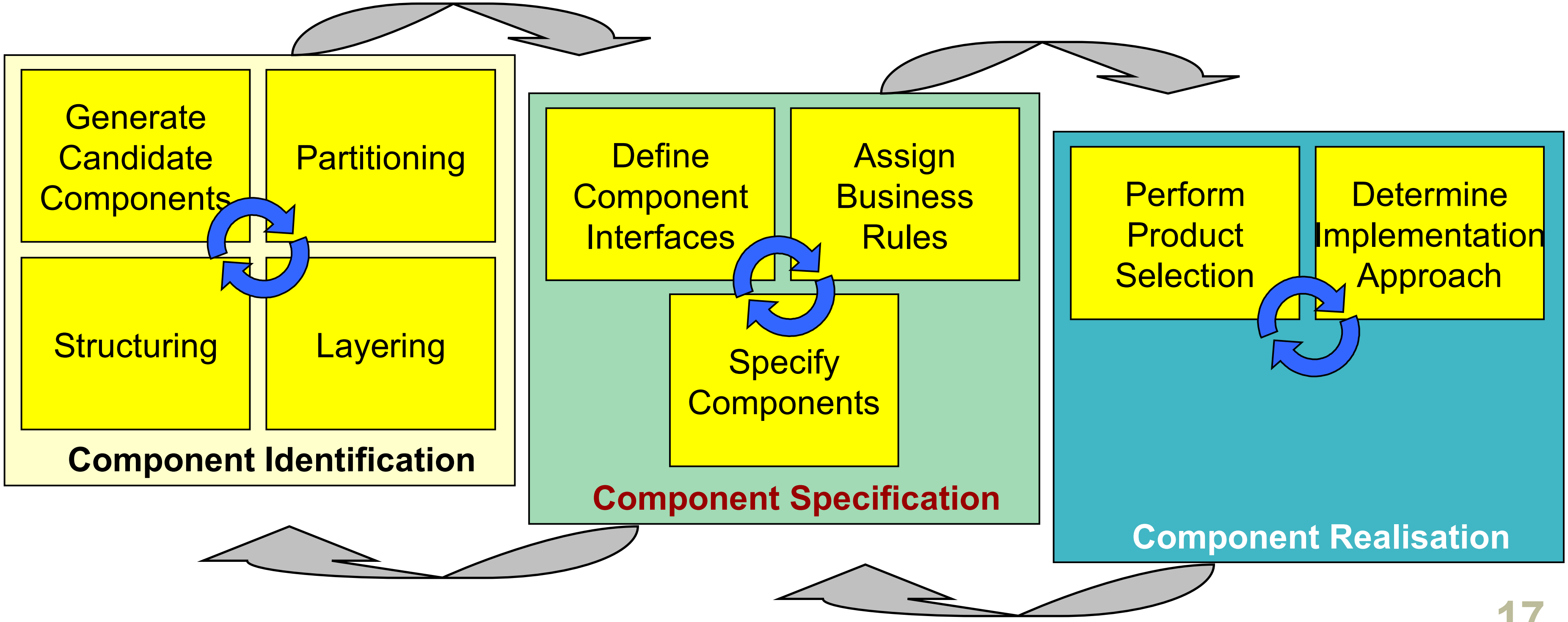
A Component model is ***never just one diagram***

A Component Model is used to describe complex software solutions

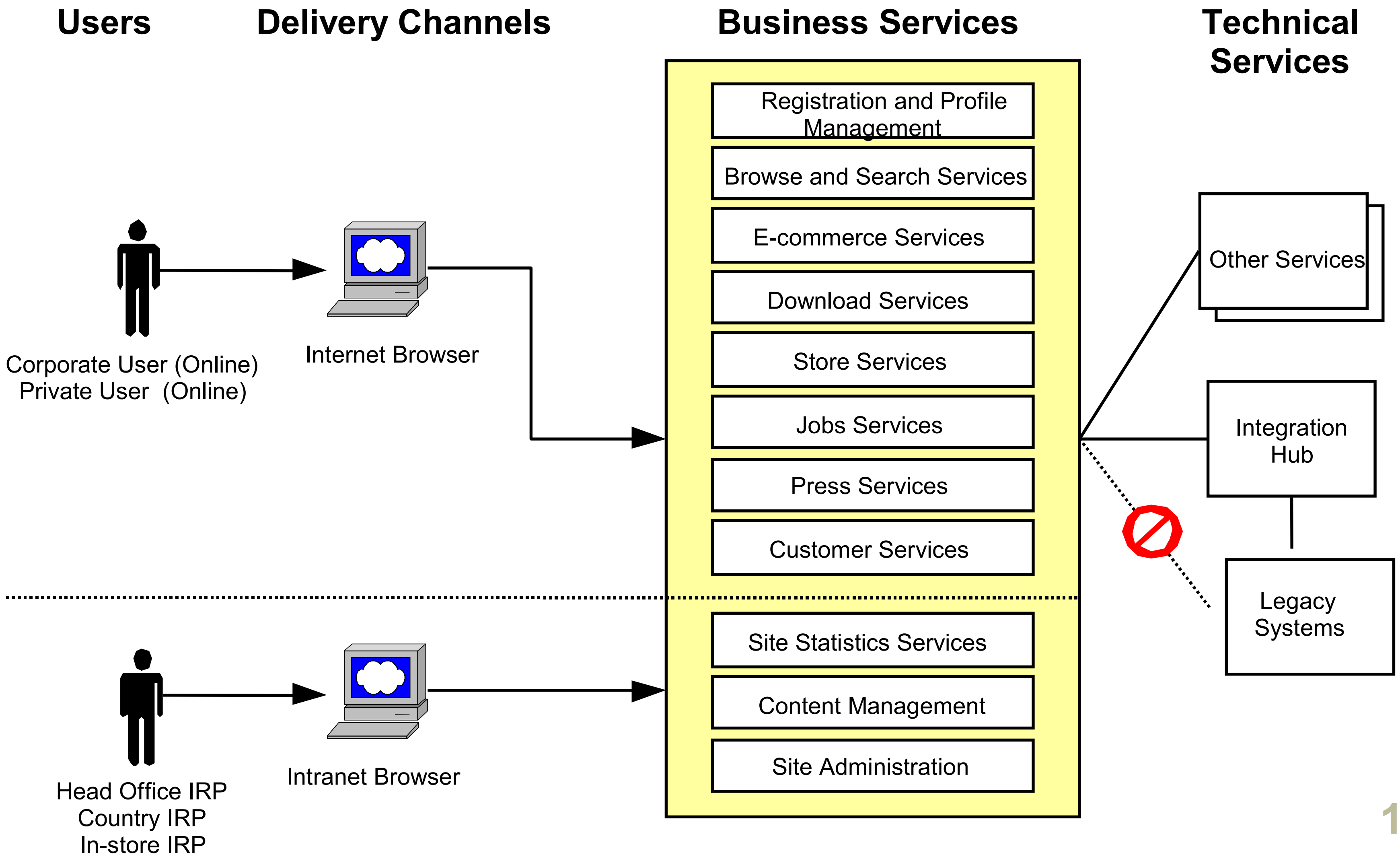
- A Component Model helps to bridge the **gap between requirements and the solution** by:
  - Ensuring that detailed specifications need not be made immediately but can be elaborated over a period of time
  - Mandating the main design principles and overall structure
- The Component Model achieves this by **defining smaller problem scopes** that can be handed to different teams while encouraging reuse.
- Each of these problem scopes can then have an associated:
  - Analysis and detailed design
  - Implementation
  - Logical and physical database model

Component modeling is divided into three stages

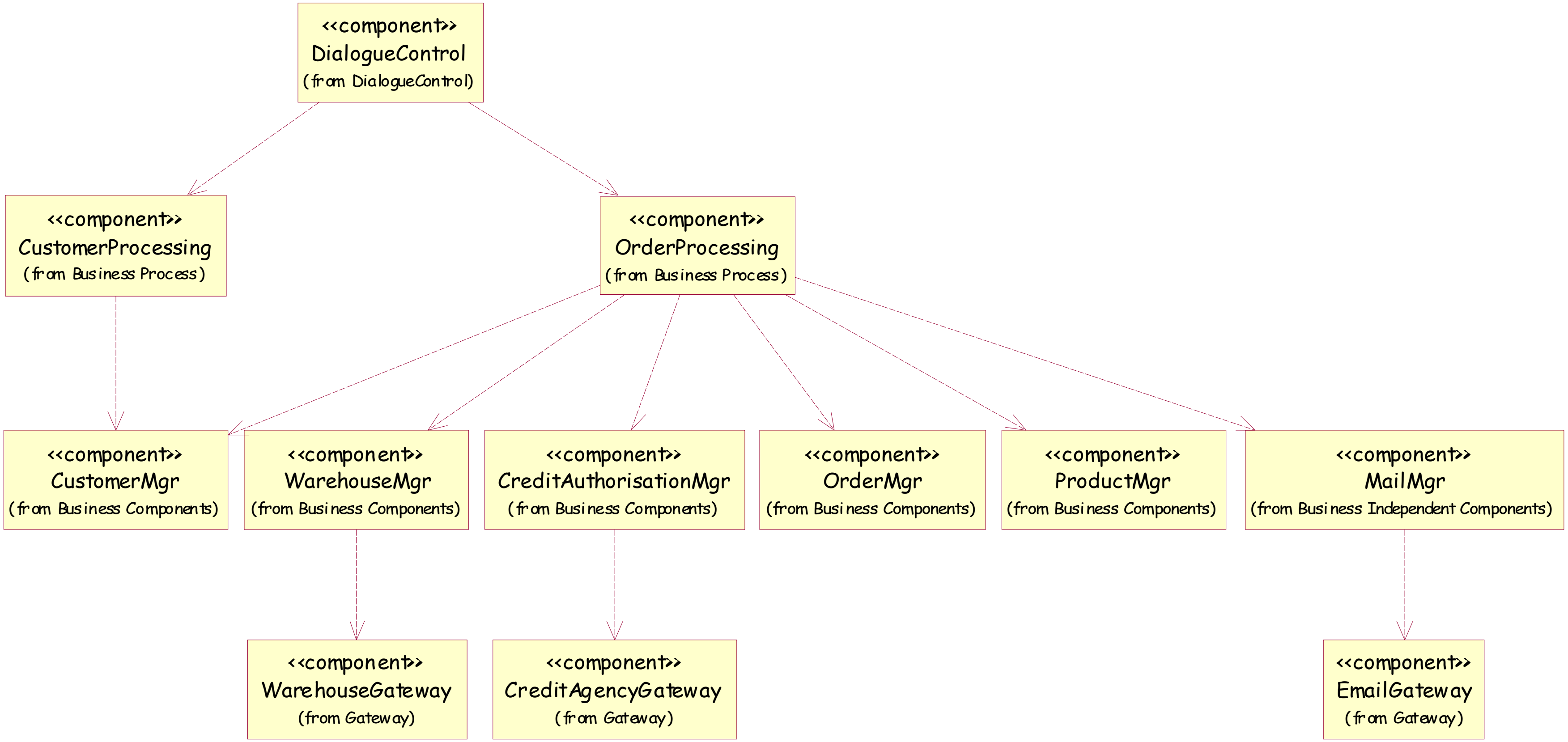
- High level design focuses on component **identification**
- Detailed design deals with component **specification**
- Development deals with component **realisation**



The Architecture Overview Diagram of a Home Shopping Example



The Component Relationship Diagram shows the static relationships among components

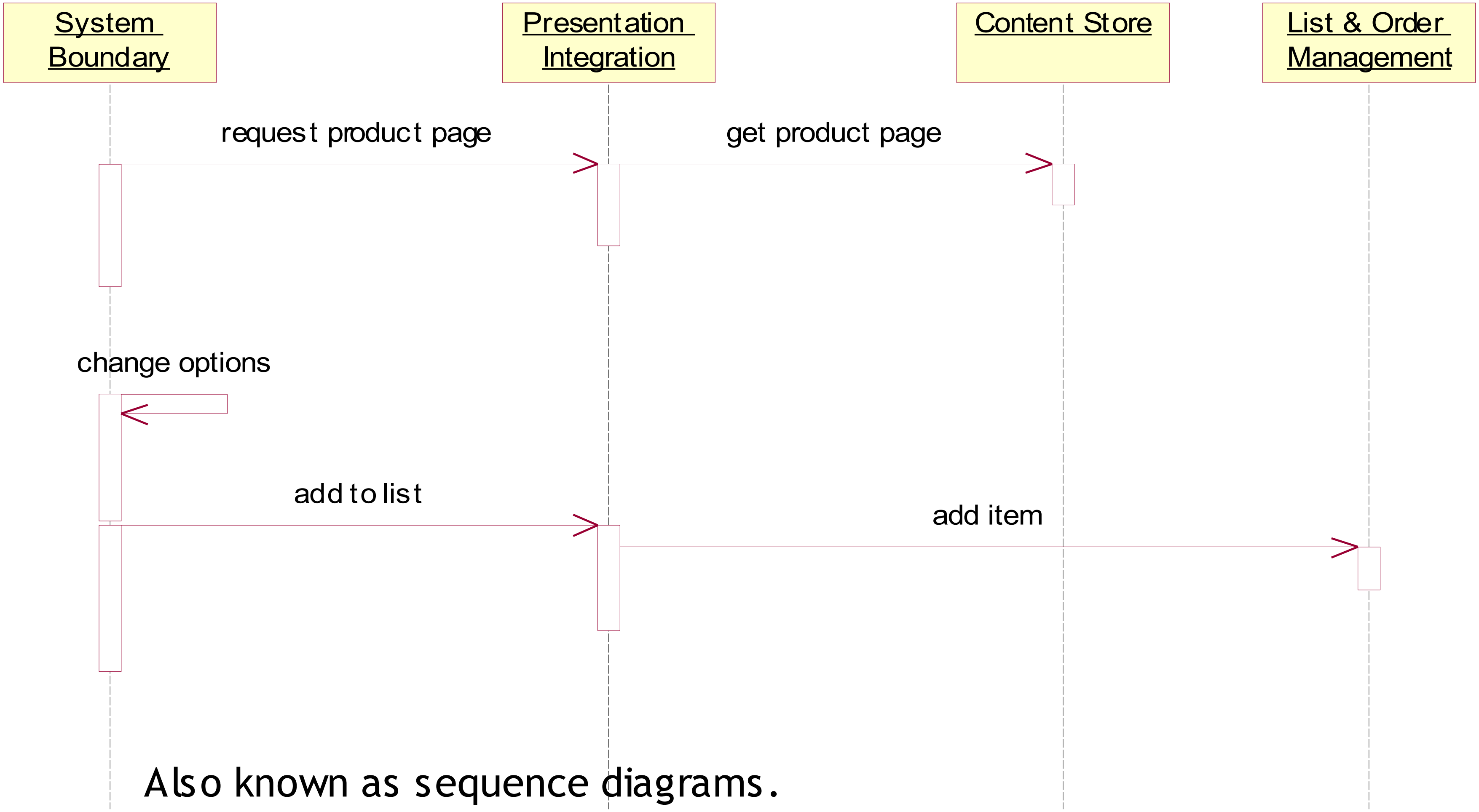


Components are identified, named and their responsibilities are described

- <COMP-001> ProductMgr

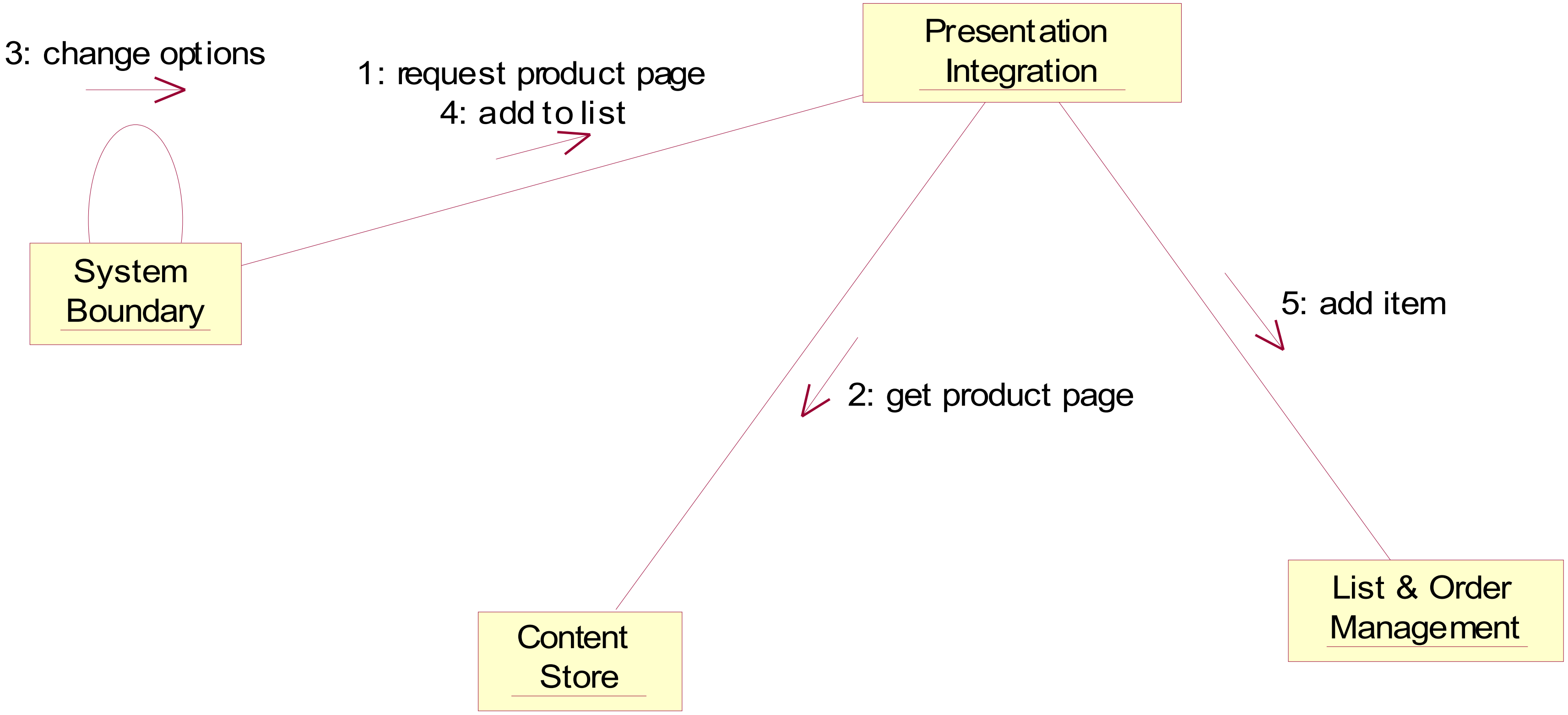
- The product manager component is responsible for interacting with back-end systems and providing product, article, and category information. Conceptually, the component performs a batch job at a set schedule, performing the following actions:
  - Querying back-end systems for new or updated products/articles (items)
  - Extracting information from the back-end system
  - Possibly transforming or filtering the information
  - Responding to real-time queries to provide product information

Component Interaction Diagrams show the dynamic relationships among components



Also known as sequence diagrams.

The Component Collaboration Diagram is a different way of looking at the Dynamic Model



Architecture Overview Diagram & Component Model

Summary

Learning Points

- Use an Architecture Overview Diagram to provide effective communication between different communities of stakeholders and developers
- An Architecture Overview Diagram is not a model
- Components are the software building-blocks of an IT system, providing services through their interfaces.
- Component Models describe the static relationships and the dynamic interactions between components